



Fine Tooling

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FT8205 User Manual

USB DAQ SilverX Series, 16Bit, 16 AI, 800KS/s, 2 AO, 24 DIO



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Product Features

- 16 analog input channels, 16 bits resolution, maximum sampling rate 800KS/s
- Programmable analog input range: $\pm 10V$, $\pm 5V$
- 2 analog output channels, 16 bits resolution, maximum sampling rate 1.2MS/s
- AO can be selected differential or single-end output mode through software, and each channel can be set individually
- 24 Bits bidirectional digital IO, can be set as input and output according to Bit/Port, 3.3V logic level
- 2-channel timer/counter
- Support secondary development using FTStudio, LabVIEW, Visual Studio and other Tools
- Free test software (Finetooling HWSUIT)

Overview

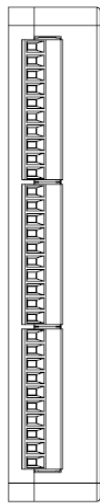
USB DAQ SilverX series FT8205 provides 16 single-ended analog input channels, 8 differential analog input channels, 16 Bits sampling rate, maximum rate up to 800KS/s, 24-bit DIO and other functions, and can achieve synchronous sampling between some channels, which can meet many common measurement requirements. The device is suitable for a variety of industrial applications such as laboratory automation, research and design verification. The free Finetooling HWSUIT supporting software provides basic measurement and analysis functions, such as SNR, THD, SINAD and other analysis. At the same time, FineTooling's automated test platform FTStudio supports all USB DAQ SilverX series data acquisition cards, which is convenient for users to use quickly.

Supported Systems: windows XP/Win7/10 Linux

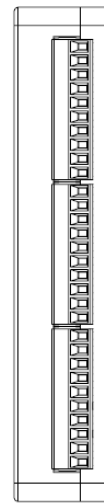
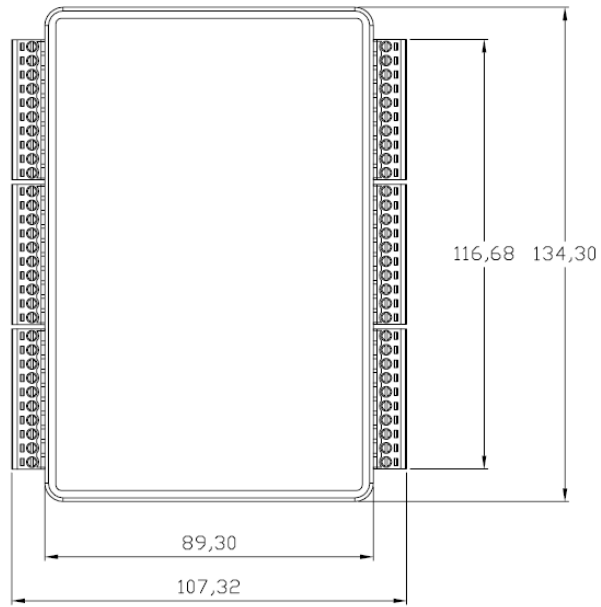
Compatible Software: LabVIEW Visual Studio FT Studio

Physical Interface:

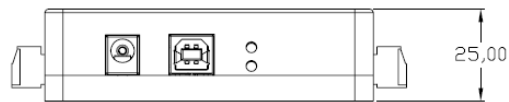
- AI and AO interface: 3.81mm pitch wire connector
- DIO interface: 3.81mm pitch wire connector
- USB interface: USB Type-B Female
- Power interface: DC5.5*2.1



左视图



右视图



Structural dimension drawing

Analog Input Characteristics

All measurements below are at room temperature 25°C unless otherwise specified.

Number of channels	8 differential channels, 16 single-end channels
ADC Resolution	16 bits
Input Signal 1KHz, DIFF; 800KSPS, 8K Samples:	
SNR (20Vpp)	>92dB
SINAD (2Vpp)	>93dB
THD (2Vpp)	<0.002%
DNL	±1LSB
INL	±1LSB
Synchronized sampling	Some channels can achieve synchronous sampling
Sampling Rate	
Maximum sample rate of a single channel	800KS/s
Multi-channel maximum sample rate (total)	800KS/s
A single channel between AI0~AI7, AI8~AI15, AI16~AI23 groups	800KS/s/CH
Minimum sample rate	—
Timing resolution	50ns
Input coupling	DC
Input range	±10V, ±5V
Maximum input current	±10mA
Input resistance	
AI+ to AIGND	> 10GΩ 6.4pF
AI- to AIGND	> 10GΩ 6.4pF
Input bias current	±20pA
Sample point buffer FIFO size	8192 samples
Multi-pass scan buffer size	8192 samples
Data output method	High-speed USB (480Mb/s)

Analog output characteristics

All measurements below are at room temperature 25°C unless otherwise specified.

Number of channels	2 single-end output channels
ADC Resolution	16 bits
SNR(Signal : 20Vpp, 1KHz)	>100dB
SINAD(Signal : 10Vpp, 1KHz)	>83dB
THD(Signal : 10Vpp, 1KHz)	<0.008%
DNL	±1LSB
Data update rate	1.2MS/s/CH
Timing Resolution	50ns
Output Coupling	DC
Output Range	±10V
Output Resistance	0.2Ω
Input bias current	±20pA
AO Output data cache	1024 samples
Slew Rate	20V/uS
Maximum drive current	10mA
Data output method	High-speed USB (480Mb/s)

Digital IO/PFI

All measurements below are at room temperature 25°C unless otherwise specified.

Number of channels	24Bits DIO, 2Bits PFI(P0.0/P0.1)
Reference Ground	DGND
Direction control	Each bit can be individually set as input and output
Input voltage range	0~3.3V
Input high level	2.2V~3.3V
Input low level	<0.7V
Output high level	>3.2V
Output low level	<0.1V
Maximum drive current	4mA
Power-on initial state	Input
Timer resolution	20ns
PFI	Can output square wave with adjustable duty cycle

Counter/Timer

All measurements below are at room temperature 25°C unless otherwise specified.

Number of channels	2 Channels, can work simultaneously
Reference Ground	DGND
Number of bits of Counter/Timer	32 Bits
Input voltage range	0~3.3V
Input high level	2.2V~3.3V
Input low level	<0.7V
Counting measurement	Edge Counter
Counting method	Count Up
Clock Accuracy	10PPM
Timing Clock	50MHZ
Timing Resolution	20ns

Power/Data Transmission Method

All measurements below are at room temperature 25°C unless otherwise specified.

Power Supply	DC12V/1A
Power Interface	DC5.5*2.1mm
Current	<250mA
Fuse	1A/30V
Data Transmission Method	High-speed USB (480Mb/s)
USB Interface	USB Type B Female
USB Current	0.5A MAX

Interface definition

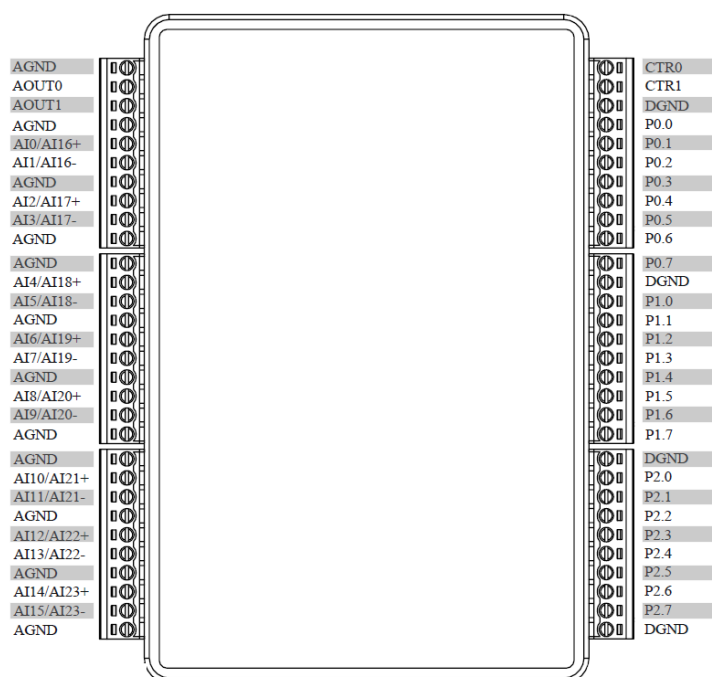
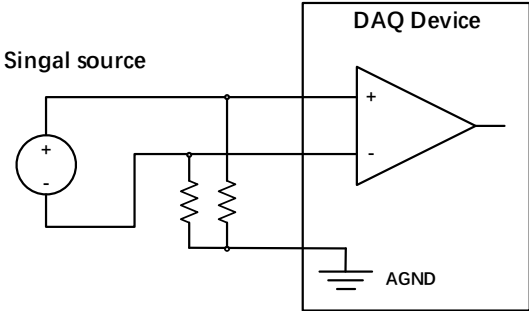
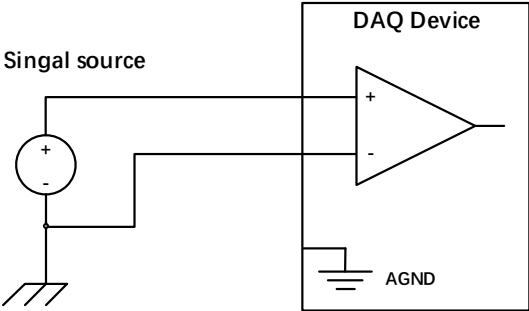
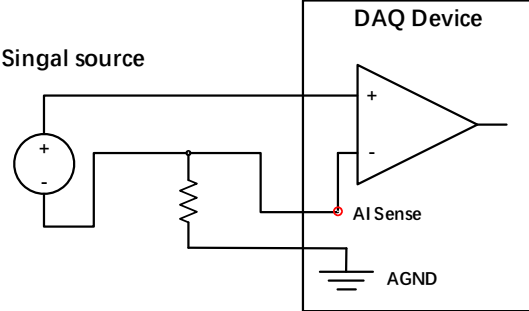
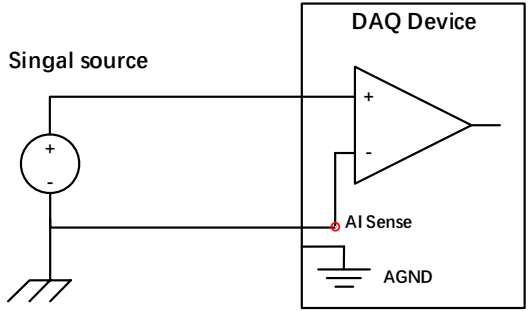
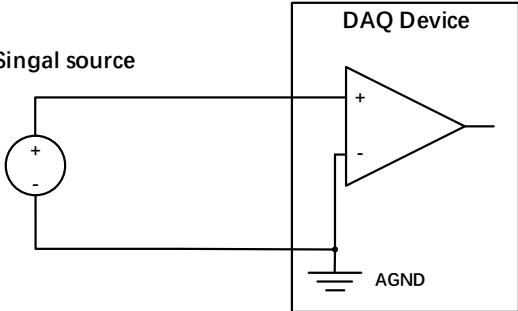
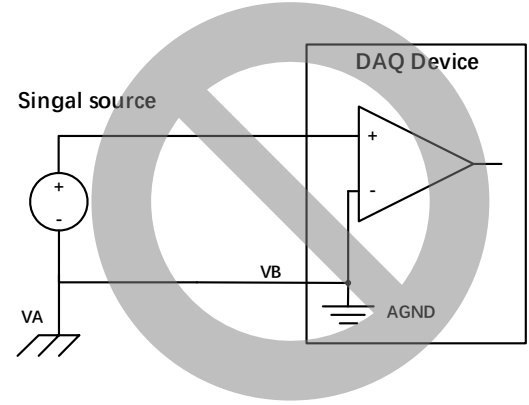


Table 1: Connector Signals

Signal Name	Reference	Direction	Description
AGND	--	--	Analog input ground, single-ended analog signal input reference ground, differential analog input bias current return path, AGND, DGND have been shorted together inside the device. Refer to Table 2: Analog Input Signal Configuration for the connection method of the analog input
AI<0..23>	AGND	Input	Analog input channel, single-ended signal channel AI<0..15>, signal reference ground is AGND, AI<16..23> is differential signal channel, the pins are multiplexed with AI<0..15>.
AOUT<0..1>	AGND	Output	Analog signal output channel, single-ended signal output, signal reference ground is AGND, output voltage signal.
DGND	--	--	Digital ground, P0.<0..7>, P1.<0..7>, P2.<0..7>, CTR0, CTR1 digital signal reference ground.
P0.<0..7>	DGND	I/O	Port0 is a bidirectional digital input and output channel, which can be configured as input or output by programming. It can be set according to Port or set by bit.
P1.<0..7>	DGND	I/O	Port1 is a bidirectional digital input and output channel, which can be configured as input or output through programming. It can be set according to Port or set by bit.
P2.<0..7>	DGND	I/O	Port2 Bidirectional digital input and output channel, which can be configured as input or output through programming. It can be set according to Port or set by bit.
CTR<0..1>	DGND	Input	Input channels for timers and counters, which can be programmed to function as timers or counters. The signal reference ground is DGND.

Table 2: Analog Input Signal Configuration

Signal Type	Floating Source	Common Ground Source
	<p>E.g:</p> <ul style="list-style-type: none">● Isolated output signal source● Battery powered equipment● Equipment powered by isolated power	<p>E.g:</p> <ul style="list-style-type: none">● Sources with non-isolated output● Equipment powered by a non-isolated power
Differential (DIFF)		
Pseudo Differential (NRSE)		
Single-end (RSE)		 <p>Note: In a common ground system, this wiring method is prohibited for single-ended signals. There is a ground loop in this wiring method, and a loop voltage will be generated between VA and VB, which will cause measurement deviation.</p>

Specifications

Items	Description
Number of channels	16 AI channels, 2 AO channels
Sampling Rate	AI : MAX 800KB/s AO : MAX 1.2MB/s
Type of ADC	SAR
Resolution of ADC	16 Bits
Range of AI	±10V/±5V
Input coupling	DC
Trigger	Software trigger
Operating Environment ¹	Temperature: -40°C~85°C, Relative humidity: 10%~90%RH
Storage Environment	Temperature: -40°C~85°C, Relative humidity: 5%~95%RH No condensation dew
Dimension	Physical dimensions (without connectors): 13.4cm 8.9cm

Note1: About environmental adaptability

- 1) Ambient temperature:
 - a) Operating temperature: 0~55°C, Complies with test standards IEC 60068-2-1 and IEC 60068-2-2
 - b) Storage temperature: -20~70°C, Complies with test standards IEC 60068-2-1 and IEC 60068-2-2
- 2) Ambient humidity:
 - a) Operating humidity: 10~90%, Complies with test standards IEC 60068-2-1 and IEC 60068-2-2
 - b) Operating humidity: 5~95%, Complies with test standards IEC 60068-2-1 and IEC 60068-2-2
- 3) For indoor applications only

Driver Installation and Usage of the Free Debugging Tool HWSuite

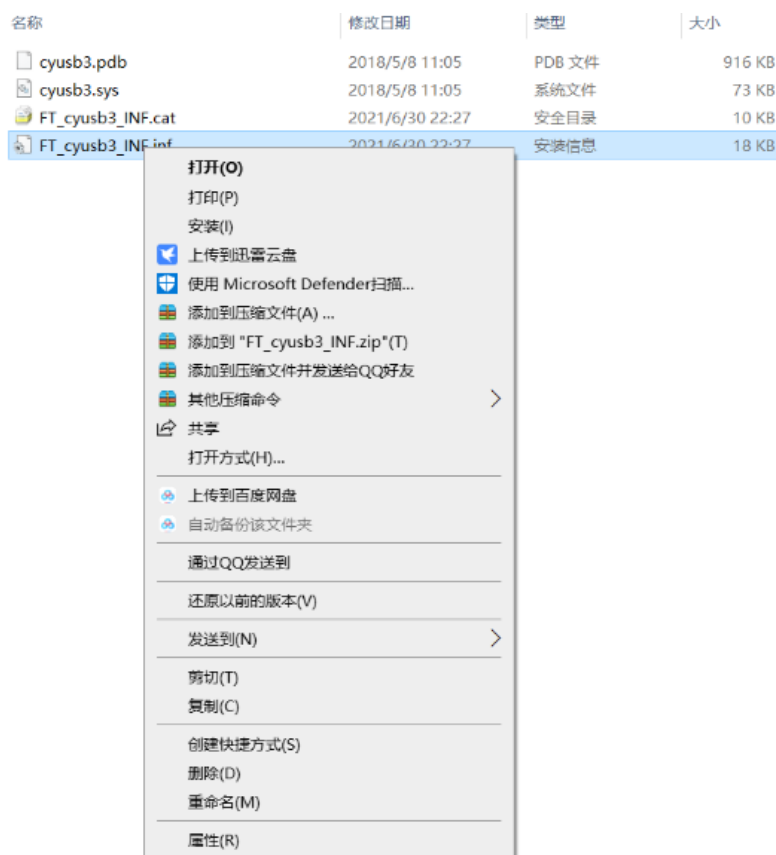
The USB drivers and HWSuit tools required by FT8205 can be downloaded from the official website of [Finetooling Technology \(Guangzhou\) Co.,Ltd.](#).

USB driver version: Please download the version after "DriverVer=06/30/2021, 2.2.3.1". Please install the driver correctly before using the capture card or related products of Finetooling Technology. Our drivers are backward compatible, so please install newer versions whenever possible.

HWSuit version: Please download "HWSuit V3.5.3.8" or later.

How to use the USB DAQ FT8205

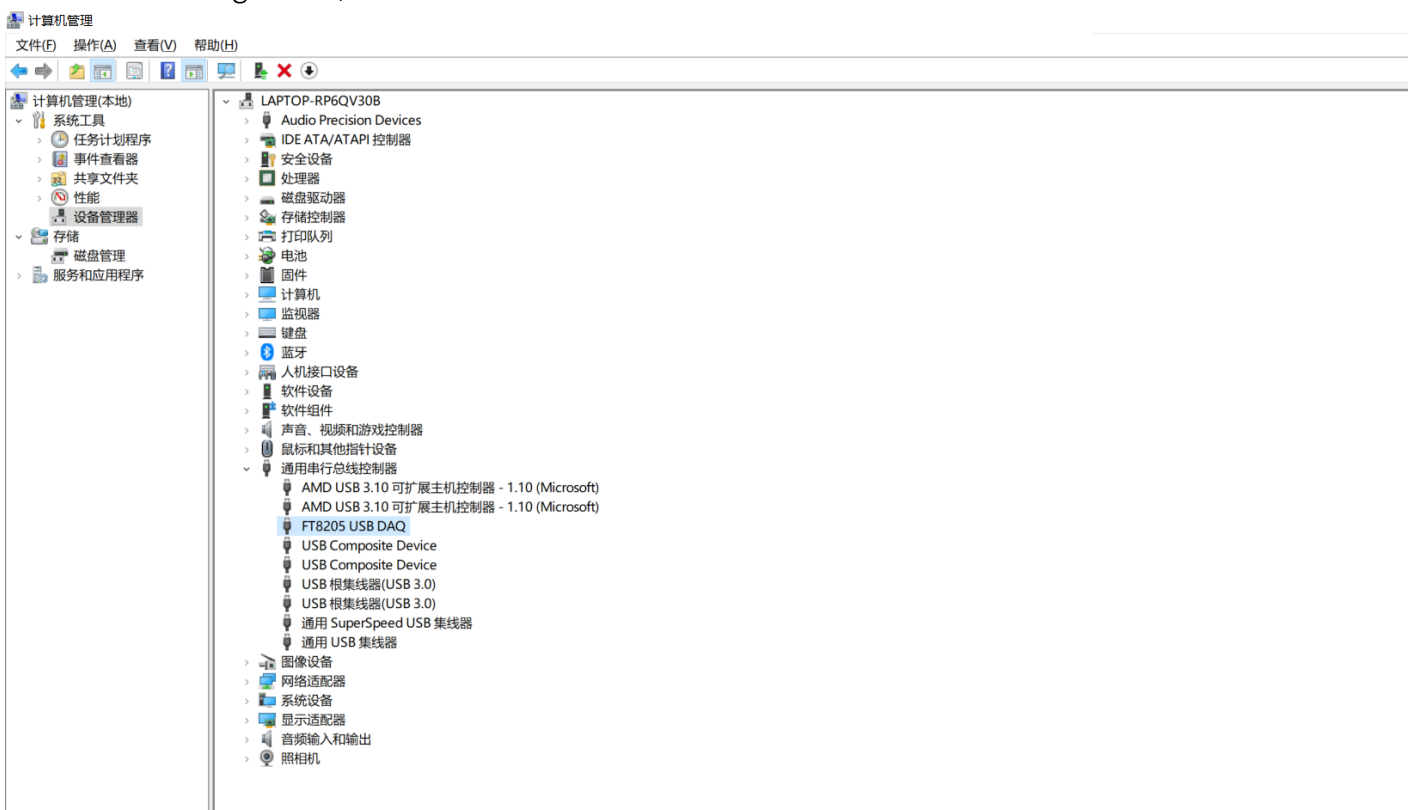
- According to the configuration of the computer, select the appropriate USB driver for installation. For example, select the USB driver of Win10/x64 to install, select FT_cyusb3_INF.inf during installation, right-click and select to install, as follows:



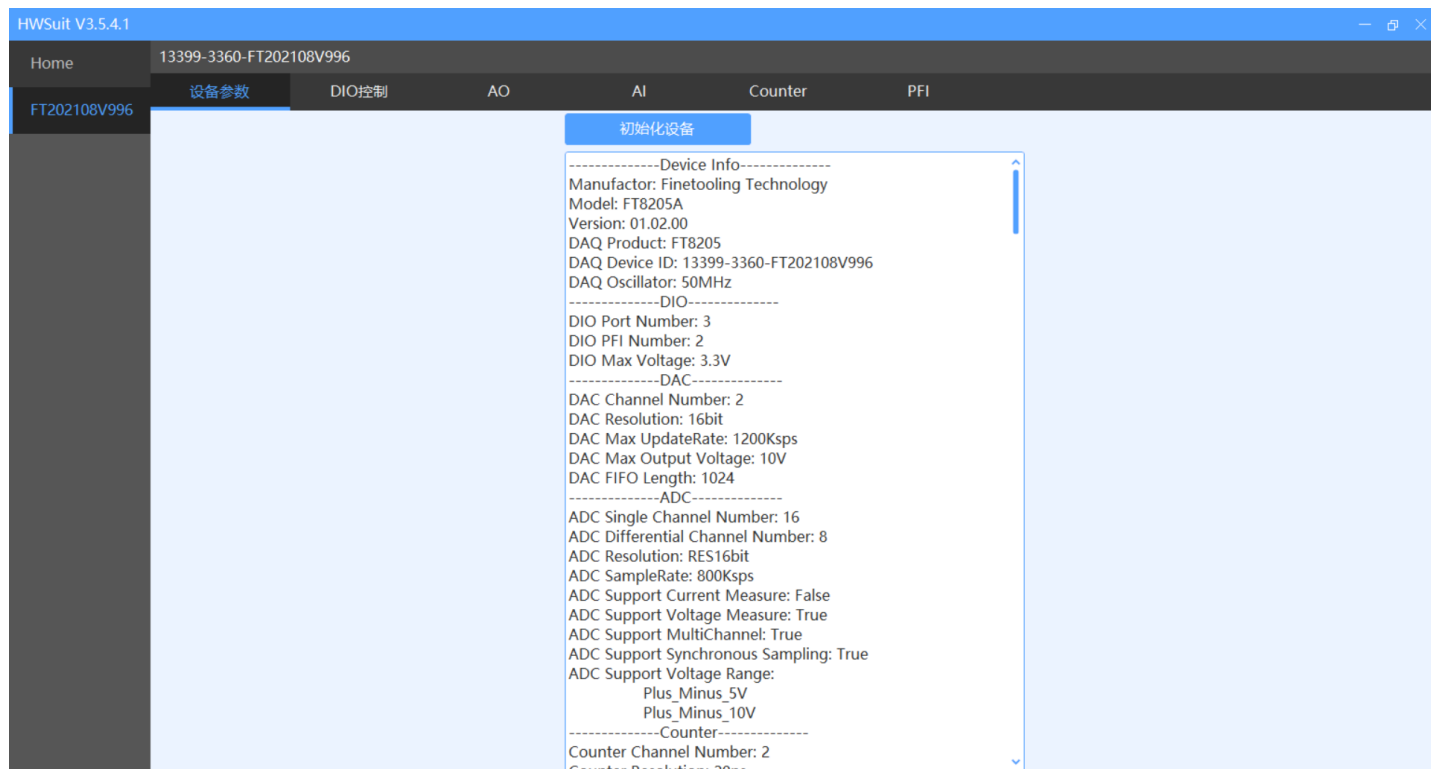
You can also right-click the device that needs to install the driver in the Device Manager -> Update Driver -> Browse My Computer for Driver -> Click Browse, change the path to the USB driver path, and click Next to complete the installation. as follows:



After the USB driver is installed successfully, you can see the corresponding device FT8205 USB DAQ in the device management, as shown below:



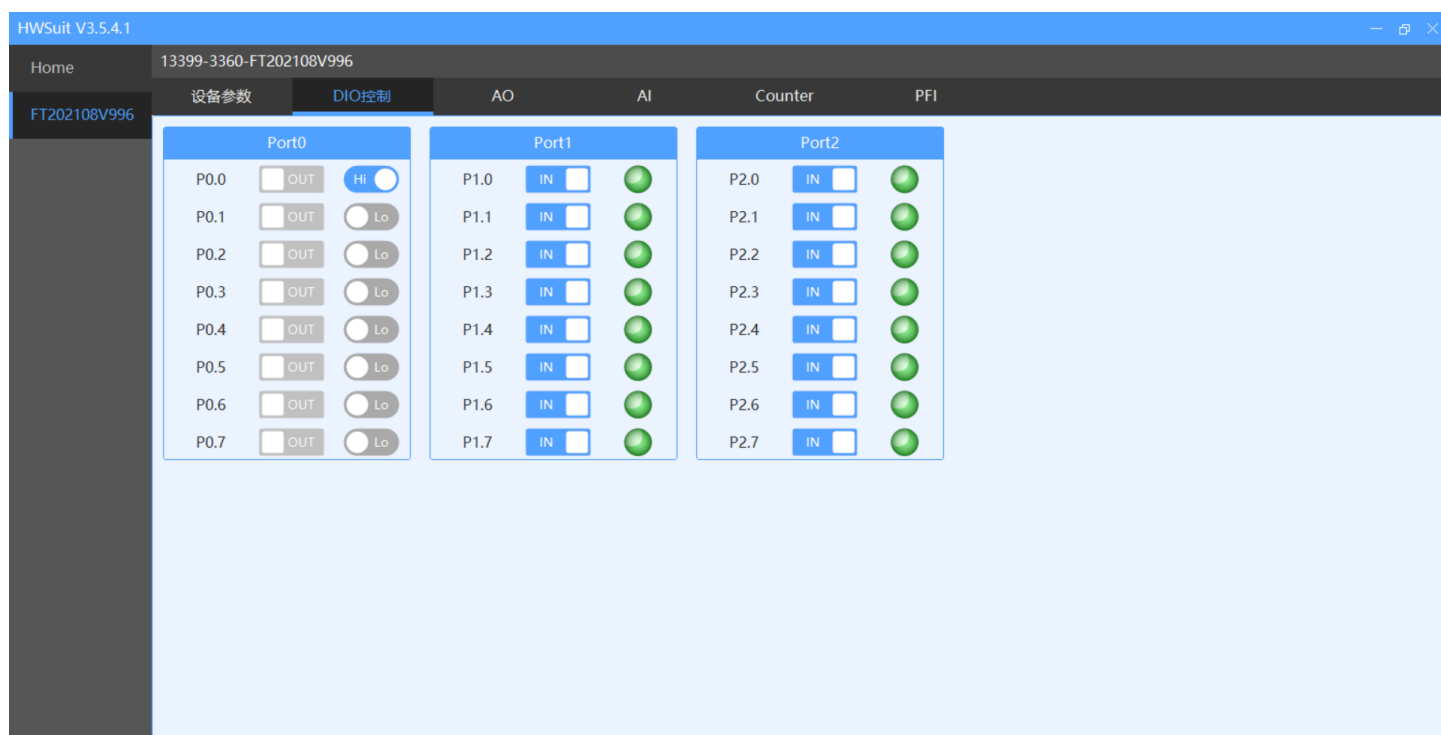
- After the USB driver is installed successfully, you will be able to use FineTooling DAQ devices conveniently through our debugging tool HWSuit. The HWSuit will have the general configuration ready from DAQs and you will find the basic information of the device on the HWSuit interface, as follows:



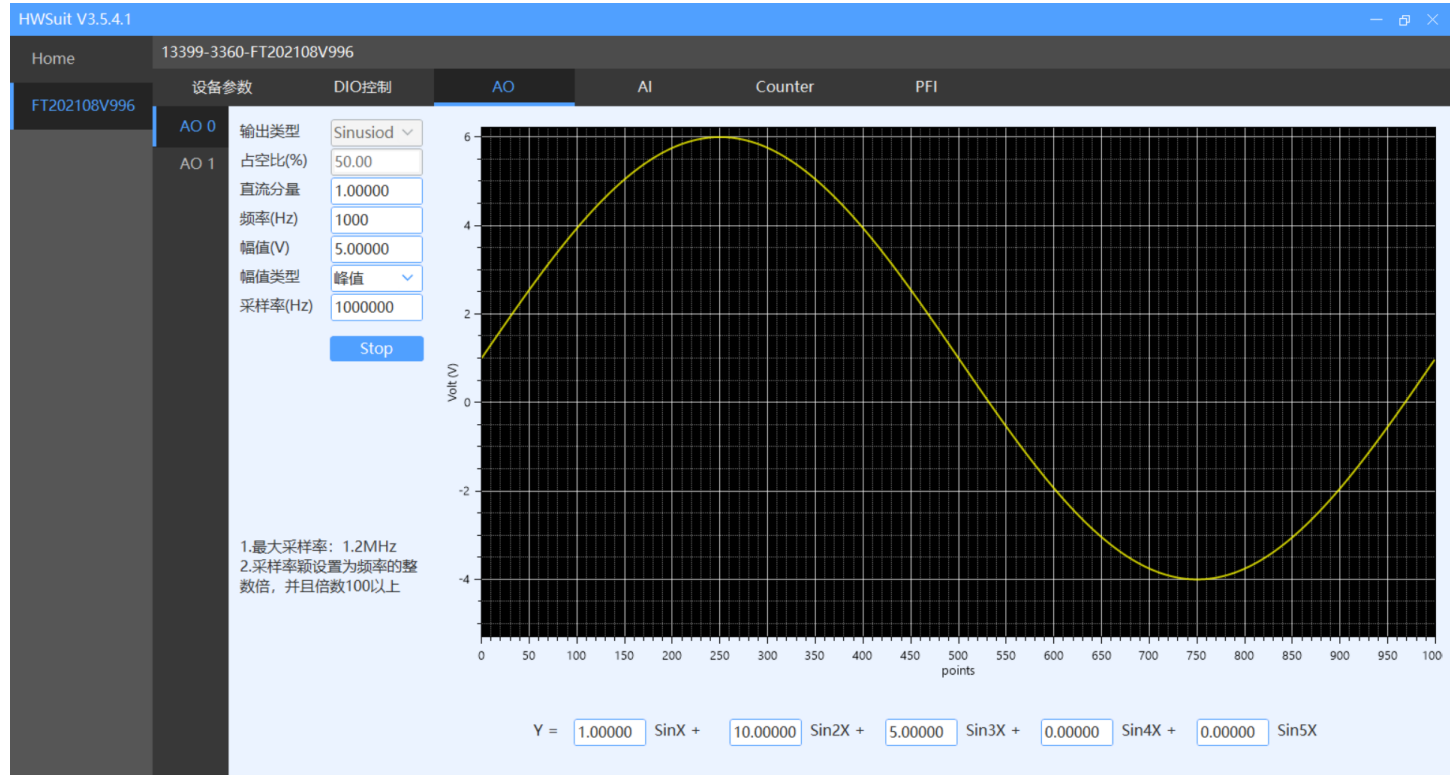
The basic information includes device model, serial number, hardware parameters, etc. Before opening HWSuit, the device might be in use already. If necessary, you can click "Initialize Device" to restore the power-on default state.

- At this point, you can see that there are multiple test interfaces in the software, such as DIO control, AO, AI, etc. The functions of each interface are described as follows:

DIO control: Device bidirectional IO control interface, you can set the direction of DIO, view the status of input IO, set the output status of DIO, etc. As follows (Port0 is set to output, and the output of P0.0 is set to "1"):

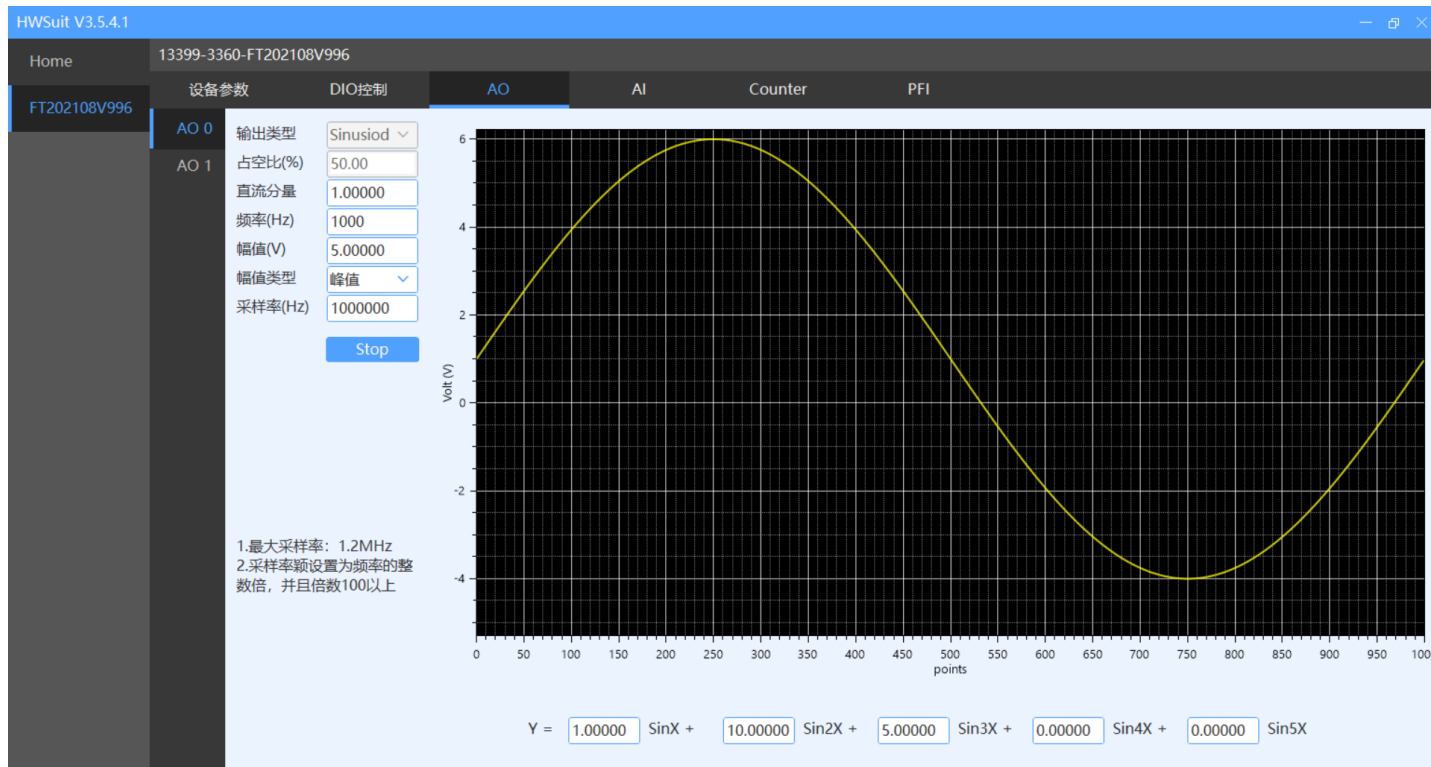


custom waveform, etc., as follows (AO0 outputs sine wave, DC component 1V, frequency 1KHZ, amplitude 5V, sampling rate 1MHZ):

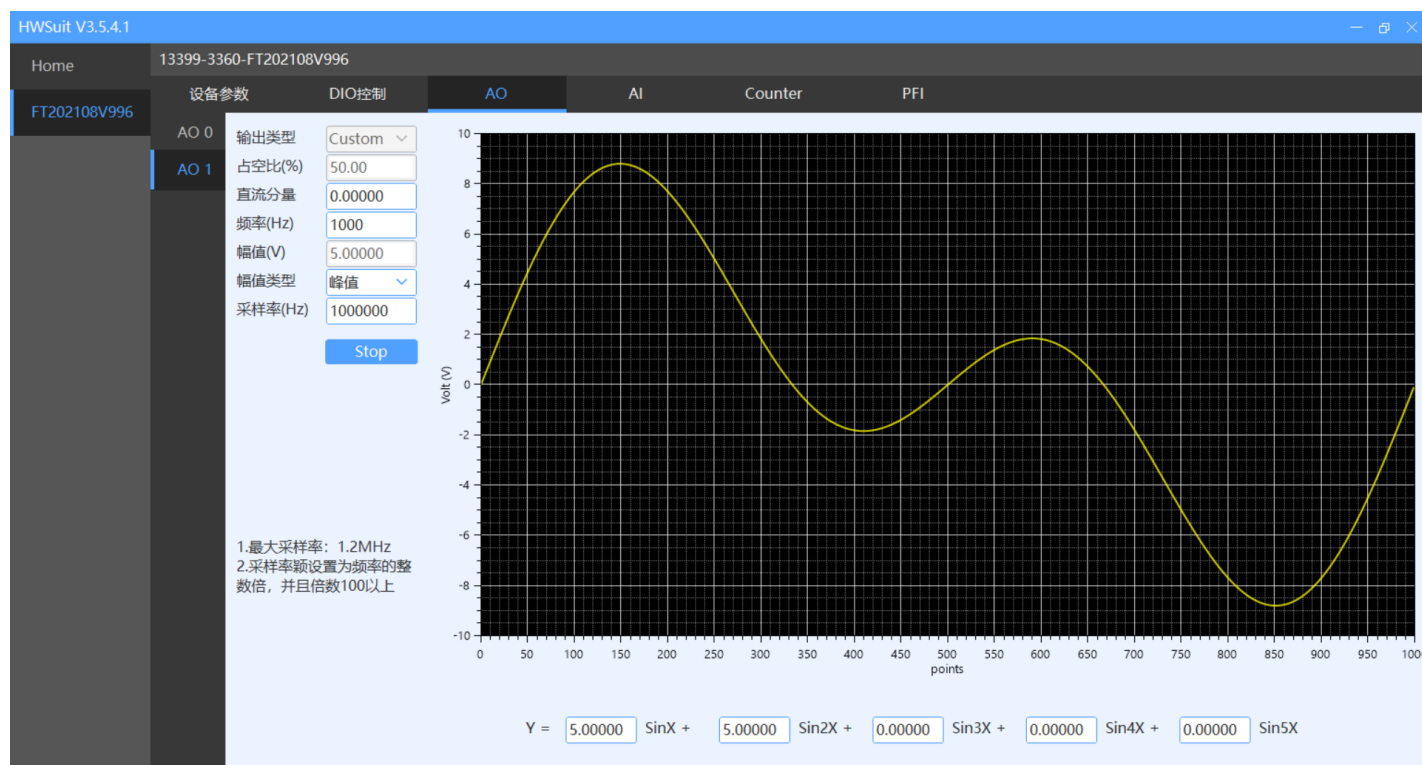


- AI : Analog data acquisition, analysis, etc., such as:
 - AO0 : Outputting sine wave, DC component 1V, frequency 1KHZ, amplitude 5V, sampling rate 1MHZ
 - AO1 : Outputting custom waveform, DC component 0V, frequency 1KHZ, fundamental frequency amplitude 5V, 2nd harmonic amplitude 5V, can be added to the 5th harmonic at most, this formula only works when the output type is Custom.

Output waveform of AO0:

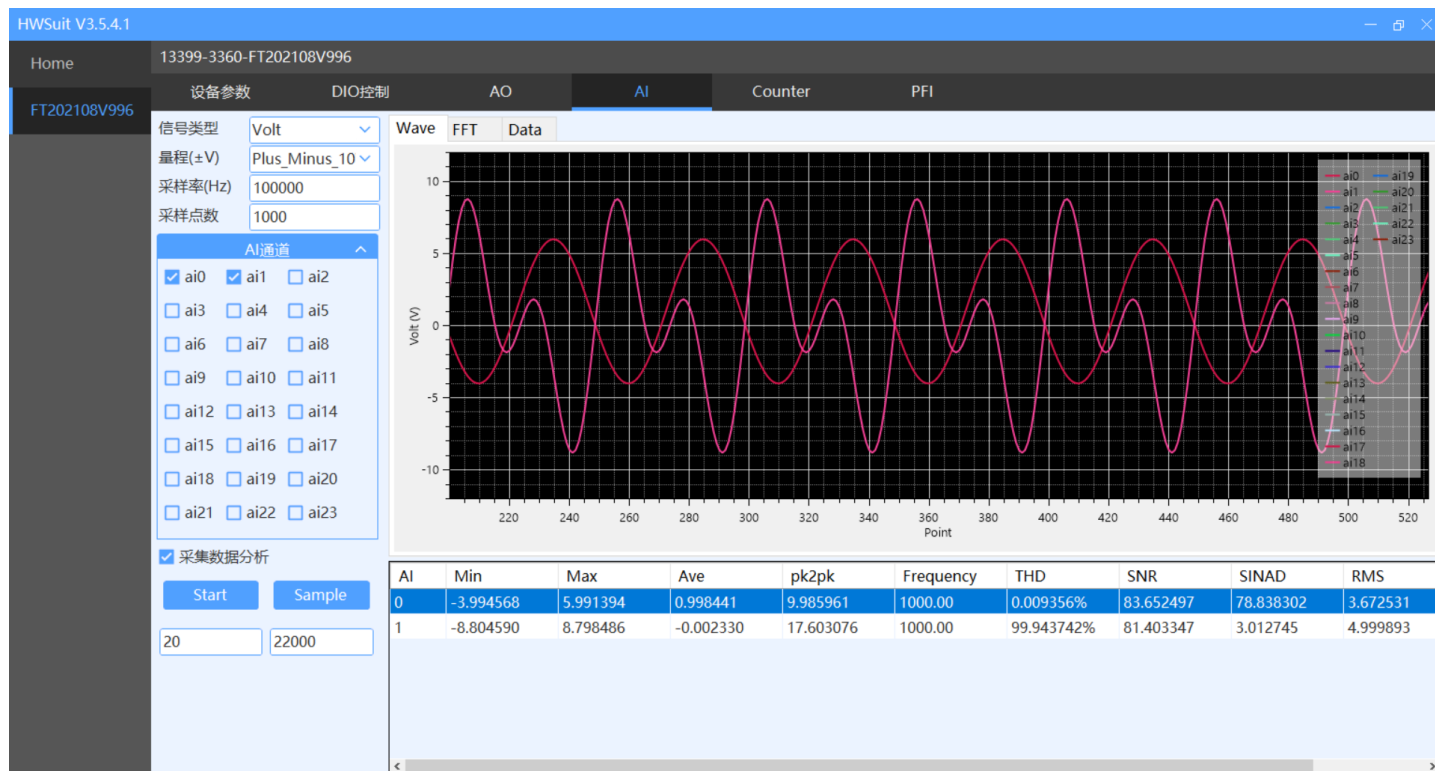


Output waveform of AO1:

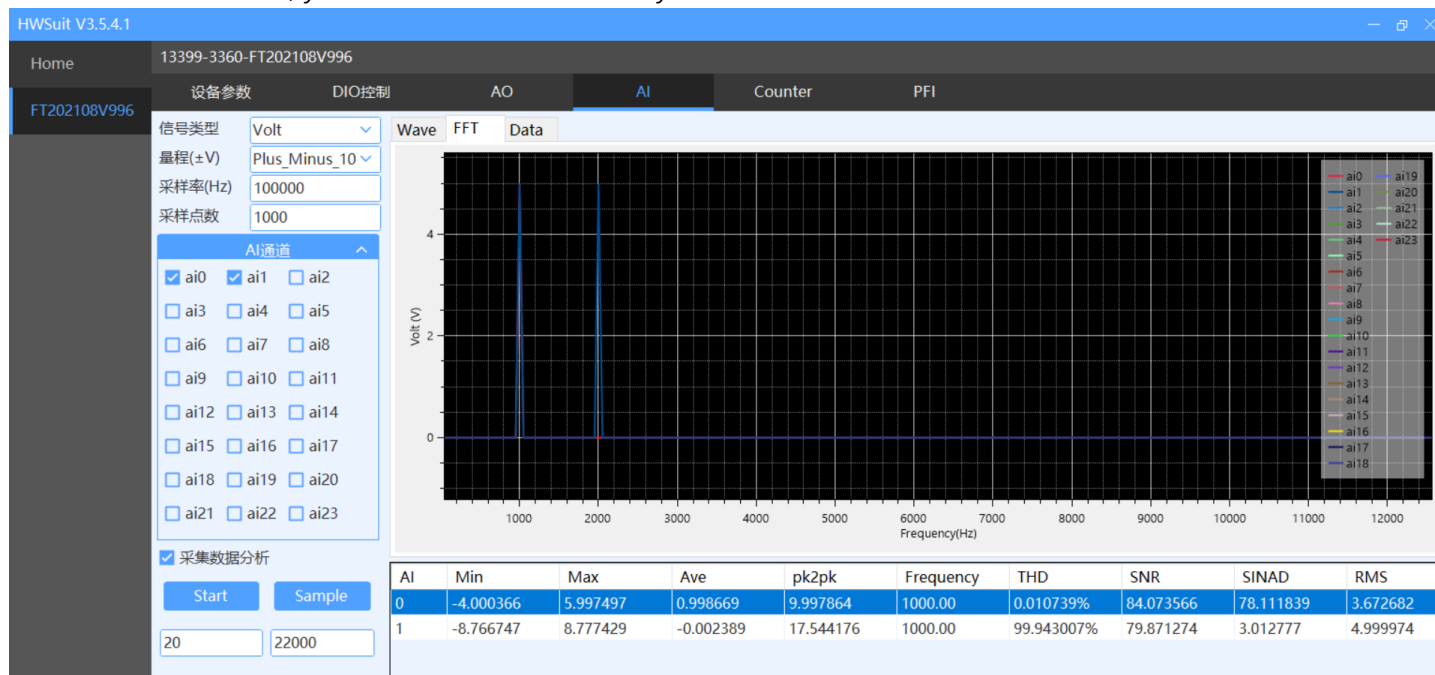


The output of AO0 is connected to AI0, the output of AO1 is connected to AI1, the parameters of AI are set to signal type: Volt, range: $\pm 10V$, sampling rate: 100KHZ, sampling points: 1000, sampling channel: AI0, AI1, select data analysis. Click Sample for single sampling (collect the set number of sampling points), as follows:

In the Wave interface, you can view the collected data's waveform, and the bottom of the window displays the data analysis results, such as peak-to-peak, THD, SINAD, RMS, etc. You can place the mouse on the waveform window and slide the wheel to zoom the waveform:

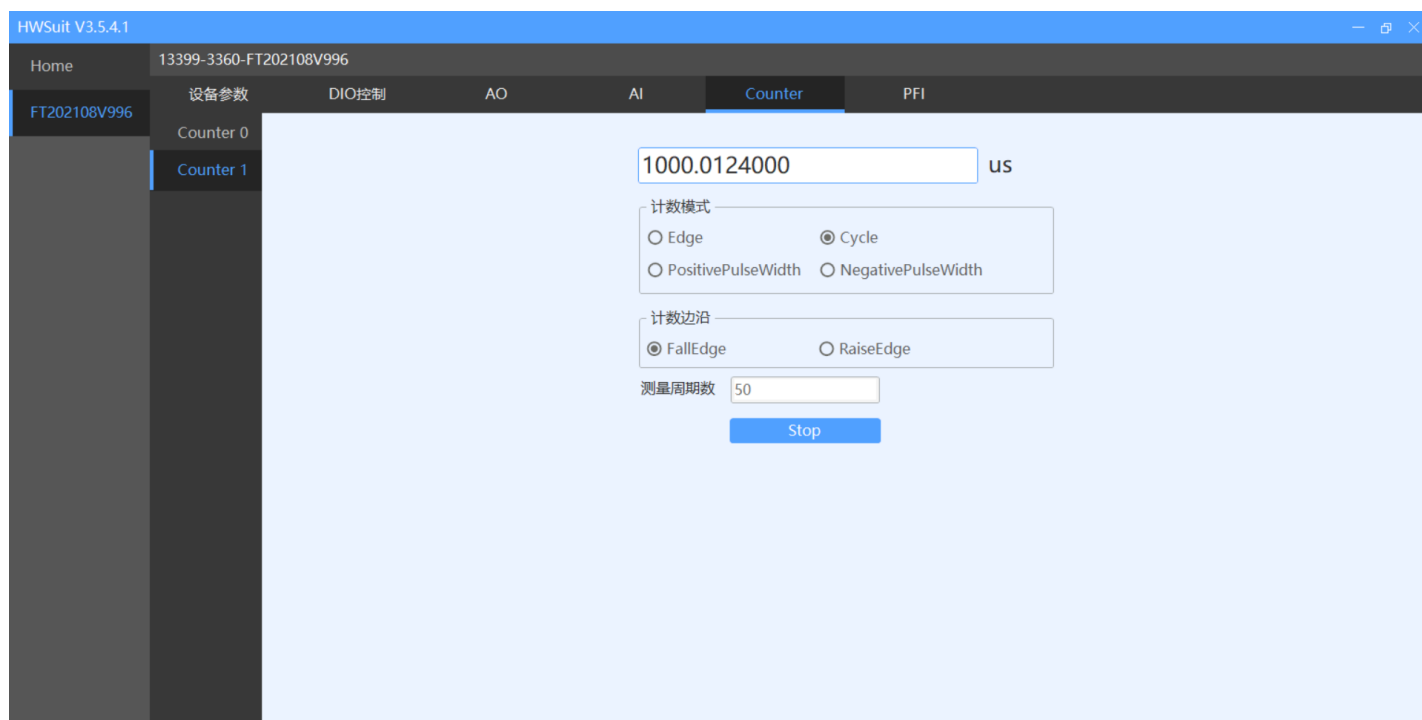


On the FFT interface, you can view the FFT analysis results of the collected data:

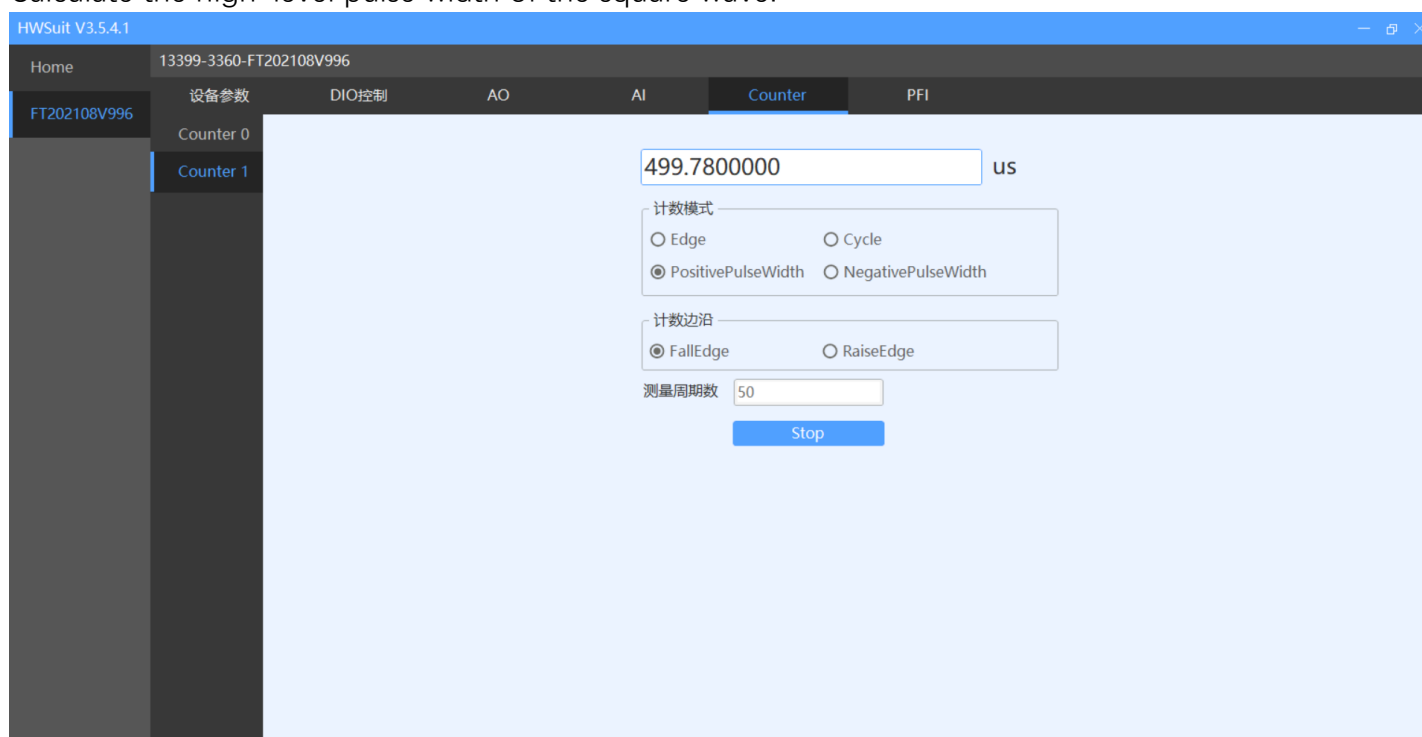


- Counter : It can perform edge counting, period calculation, high-level pulse width calculation, etc., input 1KHZ square wave signal, and the measurement results are as follows:

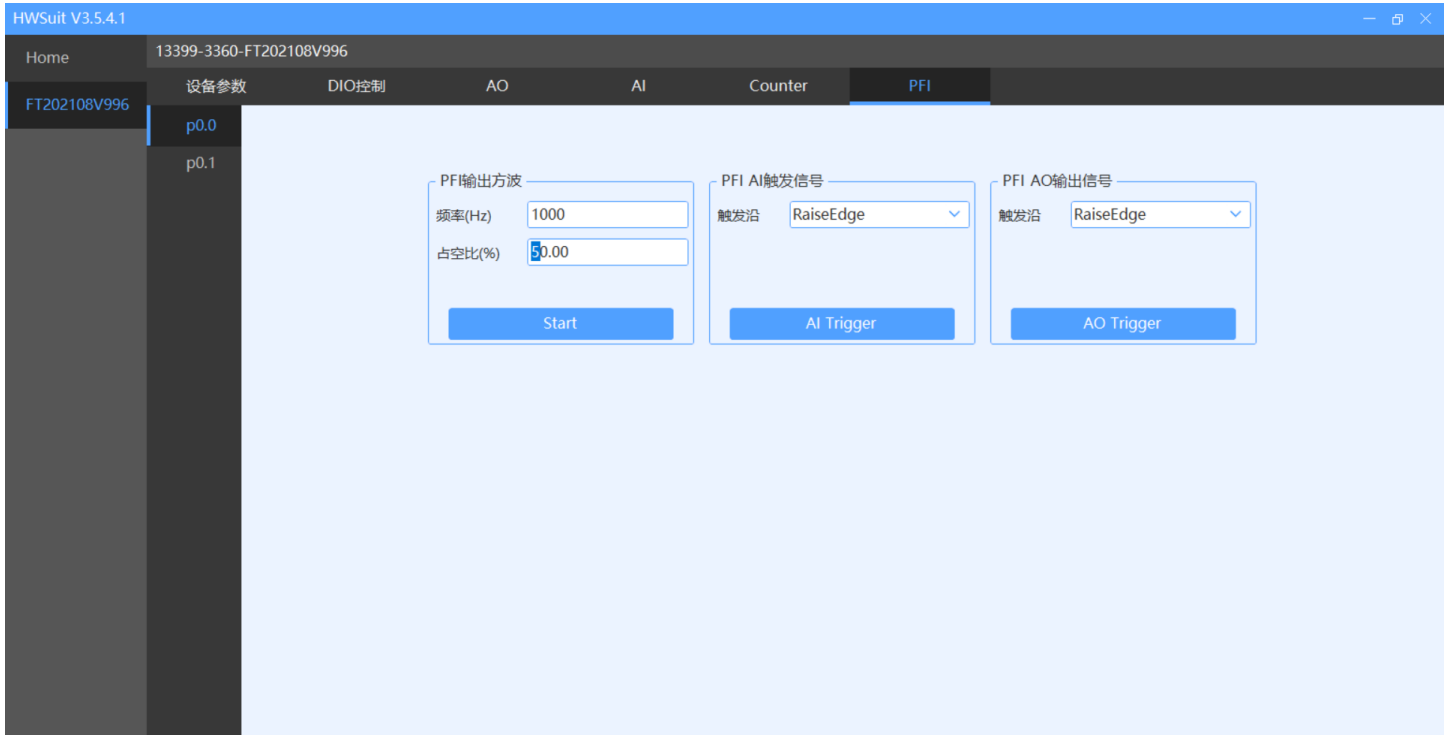
Calculate the square wave period:50



Calculate the high-level pulse width of the square wave:



- PFI : Outputting a square wave with adjustable duty cycle, only P0.0 and P0.1 have this function:



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